

Table 4.4
Summary of Stormwater Discharge Evaluation for Cadmium -- Trans-Lake Water Quality Study

WA WQ Standards	Water Quality Criteria for Cadmium ⁸	
	Acute Criteria	Chronic Criteria
	1.58 ug/L	1.14 ug/L
EPA Revised Criteria	0.83 ug/L	0.13 ug/L

Stormwater Alternative	Bridge Alternative	Rainfall/Runoff Scenario	Stormwater Runoff <i>Maximum</i> Conc. ¹	Stormwater Treatment Removal Efficiency ²	Stormwater Discharge Concentration ³	Concentrations in Containment Lagoon during Storm Event ⁴			Concentration at the Lagoon Interface with Lake (10 ft) ⁶	Concentration at Mixing Zone Boundary (100 ft) ⁷
			Cadmium (ug/L)		Cadmium (ug/L)	Concentraton at 25%	Concentration at 50%	Concentration at 100%		
		Storm Flow into Lagoon ⁵	Storm Flow into Lagoon ⁵	Storm Flow into Lagoon ⁵						
I. Pontoons with Catch Basins	4	10% WQ Treatment	5	0.55	2.3	0.01	0.02	0.02	0.00	0.00
		50% WQ Treatment	5	0.55	2.3	0.06	0.08	0.12	0.02	0.01
		WQ Treatment	5	0.55	2.3	0.12	0.16	0.24	0.05	0.01
	6	10% WQ Treatment	5	0.55	2.3	0.01	0.01	0.02	0.01	0.00
		50% WQ Treatment	5	0.55	2.3	0.05	0.06	0.10	0.04	0.01
		WQ Treatment	5	0.55	2.3	0.10	0.13	0.19	0.08	0.02
	8	10% WQ Treatment	5	0.55	2.3	0.00	0.01	0.01	0.01	0.00
		50% WQ Treatment	5	0.55	2.3	0.02	0.03	0.04	0.03	0.01
		WQ Treatment	5	0.55	2.3	0.04	0.05	0.08	0.06	0.03
II. Pontoons with Vault System	4	10% WQ Treatment	5	0.55	2.3	0.01	0.02	0.02	0.00	0.00
		50% WQ Treatment	5	0.55	2.3	0.06	0.08	0.12	0.02	0.01
		WQ Treatment	5	0.55	2.3	0.12	0.16	0.24	0.05	0.01
	6	10% WQ Treatment	5	0.55	2.3	0.01	0.01	0.02	0.01	0.00
		50% WQ Treatment	5	0.55	2.3	0.05	0.06	0.10	0.04	0.01
		WQ Treatment	5	0.55	2.3	0.10	0.13	0.19	0.08	0.02
	8	10% WQ Treatment	5	0.55	2.3	0.00	0.01	0.01	0.01	0.00
		50% WQ Treatment	5	0.55	2.3	0.02	0.03	0.04	0.03	0.01
		WQ Treatment	5	0.55	2.3	0.04	0.05	0.08	0.06	0.03

Notes:

¹ Stormwater runoff concentration based on maximum concentration from Caltrans highway monitoring data collected in 2000-01 (Kayhanian, et al., 2002), and this conservative approach was applied only for cadmium to address limited available data.

² Stormwater treatment removal efficiency represents the low range of Alternative 4's estimated effectiveness, as identified in the AKART analyses (see Table 3.2).

³ Stormwater discharge concentration is concentration of pollutant remaining after the stormwater treatment removal efficiency is applied to the maximum stormwater runoff concentration.

⁴ Background Lake Washington cadmium level of 0.01 ug/L (median) was added into the stormwater discharge concentration to represent the mixed final concentration.

⁵ Dilutions are calculated to represent stages in the storm event (25, 50 and 100 percent) during which the stormwater discharge mixes with progressively greater volumes of water in the containment lagoon (50, 75, and 100 percent); the calculations assume no escapement of runoff.

⁶ Dilution at 10 feet from the edge of the containment lagoon bottom interface with Lake Washington. Dilution rates at this interface decrease with increasing width of the containment lagoon.

⁷ Dilution at the mixing zone boundary (100 feet from containment lagoon discharge point) results from turbulent mixing and vertical diffusion in the lake. These dilutions are plausible minimum values under dry season lake conditions.

⁸ Cadmium acute and chronic criteria are present in two forms, the existing criteria are based on Surface Water Quality Standards for Washington (WAC 173-201A), and the future criteria (not in state rules at this time) are based on the US EPA 2001 Update of Ambient Water Quality Criteria for Cadmium (EPA, 2001). The freshwater acute criteria is a 1-hour average concentration and chronic criteria is a 4-day average concentration, both are not to be exceeded more than once every three years on the average. Background hardness assumed is 38 mg/L, and this is the minimum observed in the lake.

Abbriveations:

WA - Washington

WQ = water quality

ug/L = micrograms per liter

EPA = Environmental Protection Agency

Conc. = concentration

% = percent

ft = feet

mg/L = milligrams per liter

